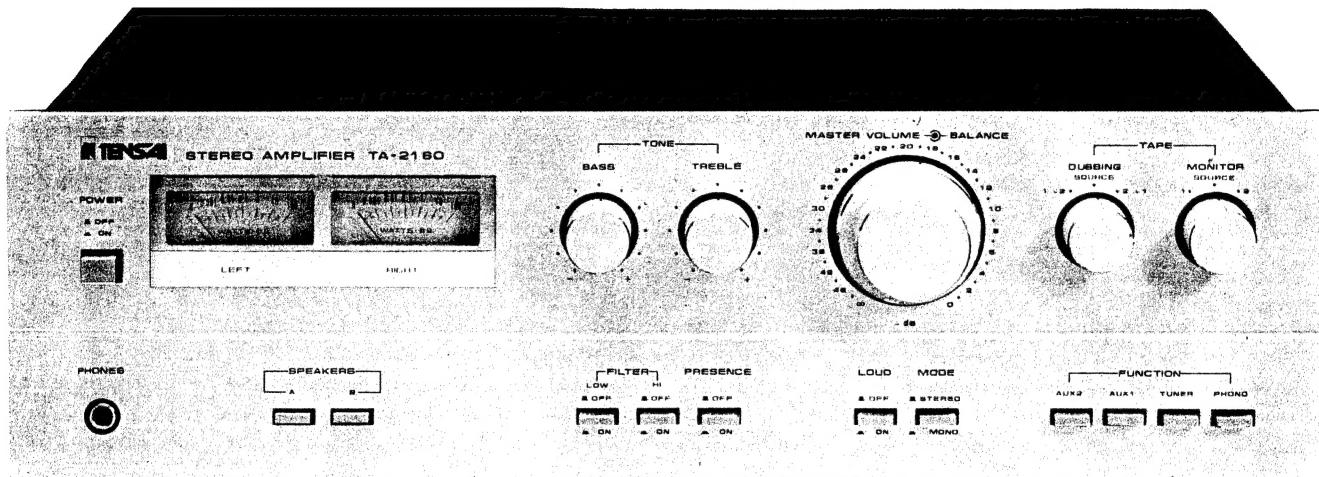


TA-2160
60W PRE-MAIN AMPLIFIER



TENSAI
INTERNATIONAL



Service Manual

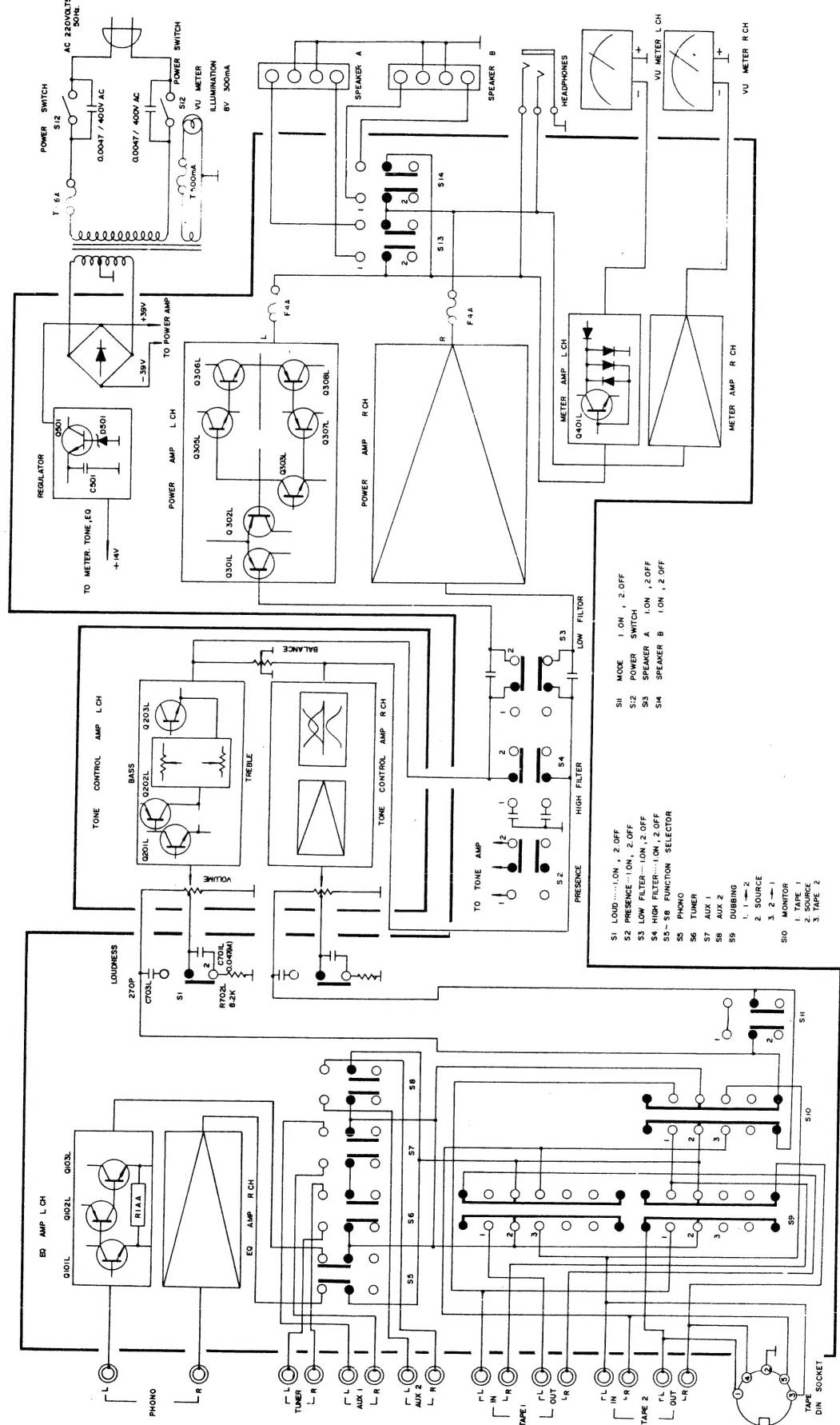
CONTENTS

SPECIFICATIONS	2
FUNCTIONAL BLOCK DIAGRAM	3
ELECTRICAL ADJUSTMENT PROCEDURE	4
EXPLODED VIEW OF CABINET AND CHASSIS	5,6
TOP VIEW OF P.C. BOARDS.....	7,8
PART LIST.....	9,10
POINT TO POINT WIRING DIAGRAM.....	11,12
SCHEMATIC DIAGRAM	13,14
NOTES	15

SPECIFICATIONS

POWER OUTPUT, continuous RMS with no more than 0.1% THD.	
at 8 ohms, 1 KHz	50W
at 4 ohms, 1 KHz	60W
THD at 1 KHz half power	0.05%
IMD at 300 Hz: 7 KHz = 4:1, half power	0.05%
POWER BANDWIDTH at half power	10Hz-45KHz
DAMPING FACTOR at 1 KHz, 8 ohms	30
S/N RATIO , CCIR weighted/Unweighted	
Tuner/Aux/Tape	95/90 dB
Phono	80/70 dB
INPUT SENSITIVITY/IMPEDANCE for 50W output	
Tuner/Aux/Tape	160mV/47 Kohm
Phono	2.5mV/47 Kohm
PHONO INPUT OVERLOAD at 1 KHz, 0.1% THD	120mV
TONE CONTROLS, Bass at 100 Hz, Treble at 10 KHz	± 10dB
LOUDNESS BOOST at 100 Hz/10 KHz	+8 / +6dB
PRESENCE BOOST at 1 KHz	+ 5 dB
HIGH FILTER at 10 KHz	— 3 dB
LOW FILTER at 100 Hz	— 3 dB
CHANNEL SEPARATION at 1 KHz	55 dB
INPUT CROSSTALK at 10 KHz	70 dB
POWER CONSUMPTION at rated output	300W
at no signal	20W
UNIT DIMENSION (W x H x D)	430 x 136 x 319 mm
UNIT WEIGHT	8.3 Kg

BLOCK DIAGRAM



ELECTRICAL ADJUSTMENT PROCEDURE

STEP	ALIGNMENT	CONNECTIONS	ADJUST	ADJ. FOR	REMARKS
1	BIAS CURRENT ADJ. L-CH	CONNECT DC MV METER BETWEEN EMITTERS OF POWER TRANSISTORS (Q306L&Q308L) AS SHOWN IN FIG1.	VR301L	DC16MV $\pm 2\text{MV}$	1. SET VOLUME CONTROL TO MINIMUM. 2. FOR ADJUSTMENT, WAIT 10 MINUTES AFTER THE POWER SWITCH IS TURNED ON. 3. THIS BIAS CURRENT ADJUSTMENT CONVERTS CURRENT VALUE INTO VOLTAGE BY OHM'S LAW ($\approx 30\text{mA}$).
2	BIAS CURRENT ADJ. R-CH	CONNECT DC MV METER BETWEEN EMITTERS OF POWER TRANSISTORS (Q306R & Q308R) AS SHOWN IN FIG1.	VR301R		
3	VU METER OUTPUT LEVEL ADJ. L-CH	CONNECT 1KHZ INPUT TO AUX IL CH AND INCREASE VOLUME UNTIL 10W OUTPUT INTO 8 OHMS LOAD IS MEASURED AS SHOWN IN FIG 2.	VR401L	10W SCALE OF VU METER	1. SET TONE AND BALANCE CONTROLS TO CENTER POSITION. 2. SET FUNCTION SELECTOR TO AUX 1 POSITION. 3. SET ALL FILTERS TO OFF POSITION.
4	VU METER OUTPUT LEVEL ADJ. R-CH	CONNECT 1KHZ INPUT TO AUX IR CH AND INCREASE VOLUME UNTIL 10W OUTPUT INTO 8 OHMS LOAD IS MEASURED AS SHOWN IN FIG 2.	VR401R		

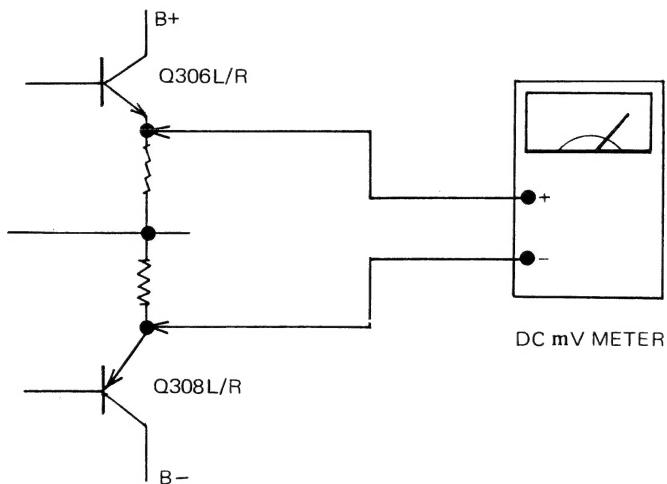


Fig. 1. Bias Current Adjustment

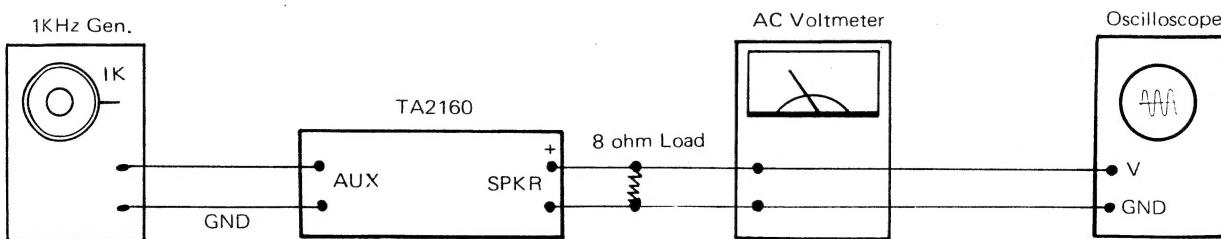
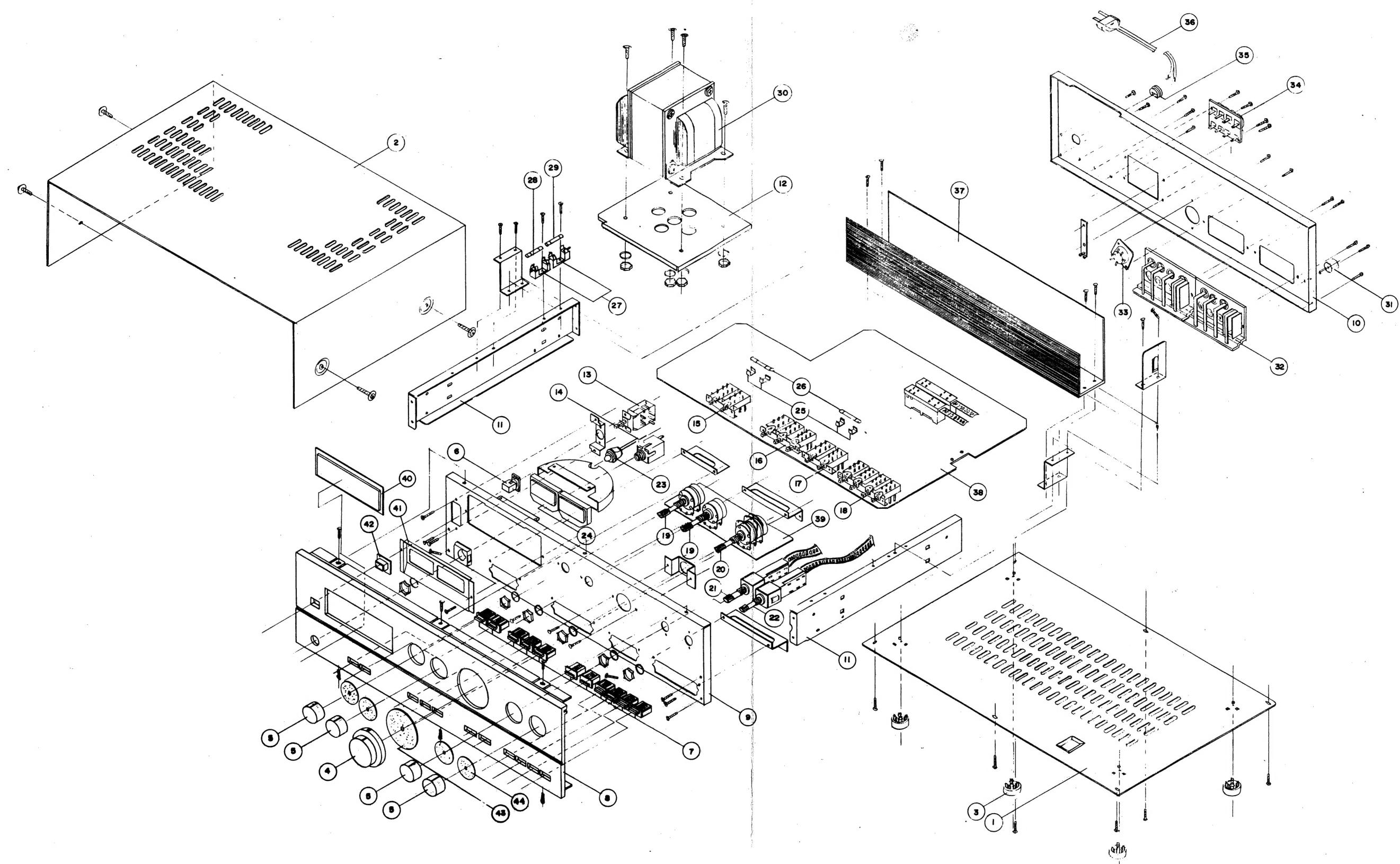


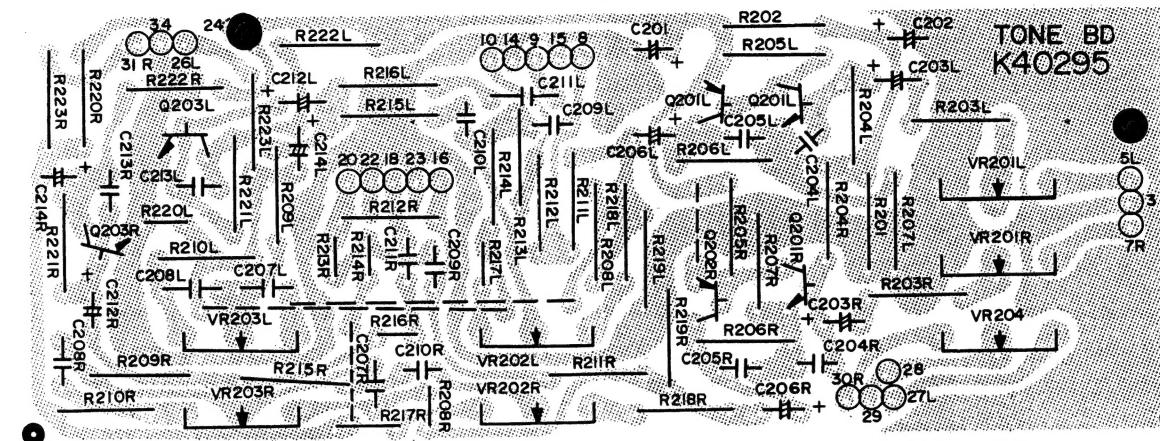
Fig. 2. VU Meter level adjustment

EXPLODED VIEW OF CABINET AND CHASSIS

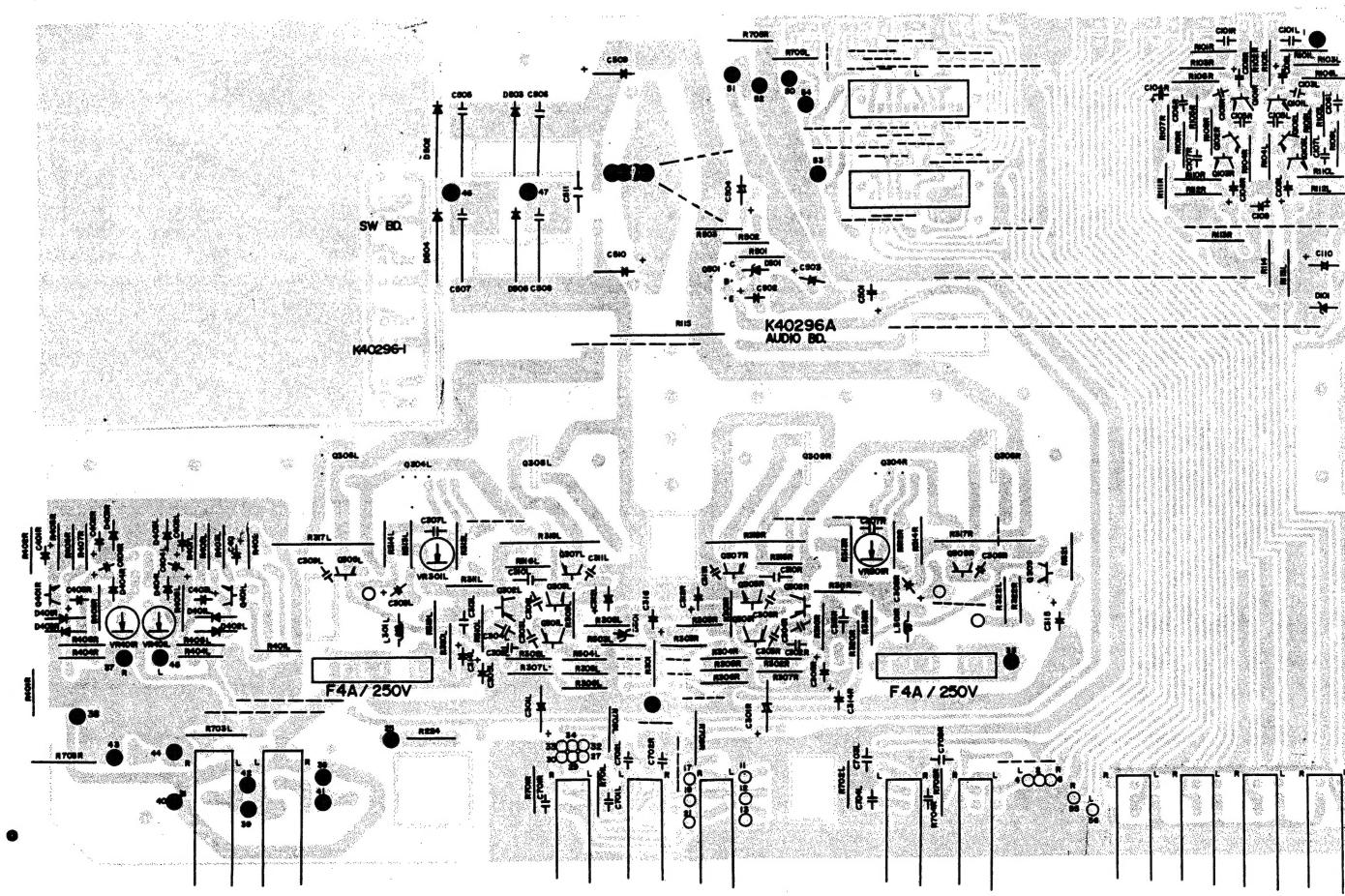


TOP VIEW OF P.C. BOARDS

TONE CONTROL PCB PARTS LOCATION (K40295)



AUDIO AMP PCB PARTS LOCATION (K40296)



PARTS LIST

Ref. No.	Parts No.	Description	Q'ty
PACKING PARTS LIST			
	PE-74172-02	Inner Box	1
	PE-74066	Poly Bag	1
	PC-74171	Cushion (Right & Left)	2

ACCESSORY PARTS LIST			
	96033-1	Operation Manual	1
	96000-10	Product-Certificate Card	1

CABINET PARTS LIST			
1	PC-62242	Bottom Cover	1
2	PC-62243	Cabinet	1
3	AD-71045	Foot Ass'y	4

APPEARANCE PARTS LIST			
4	AD-72174	Double Knob Ass'y	1
5	PE-72173	Control Knob	4
6	AE-72171	Push Knob Ass'y (Power)	1
7	AE-72170	Push Knob Ass'y (Function)	11
8	AC-61076	Front Panel Ass'y	1

CHASSIS PARTS LIST			
9	PC-62241	Front Chassis	1
10	PC-62244	Back Chassis	1
11	PD-62240	Main Frame	2
12	PD-68049	Trans.B.K.T.	1

ELECTRICAL PARTS LIST			
13	PE-95055	Power SW(SDG 5P E)	1
14	PE-95035	Phone Jack	1
15	PE-90091	Speaker Push SW	1
16	PE-90190	3 gang Push SW (Filters)	1
17	PE-90192	2 gang Push SW (Speaker)	1
18	PD-90189	4 gang Push SW (Function)	1
19	PE-15084	Potentiometer (Tone)	2
20	PD-15085	Potentiometer (VOL/BAL)	1
21	AE-90197	Remote SW Ass'y (Dubbing)	1
22	AE-90198	Remote SW Ass'y (Monitor)	1
23	AE-64058	Lamp (Pilot&Meter)	1
24	PE-75028	Meter VU (Power Level)	2
25	PE-69094	Fuse Clip (20m/m)	4
26		Fuse (F4A/250V) Speaker	2
27	PE-69096	Fuse Holder (20m/m)	2
28		Fuse (T500mA/250V) Lamp	1
29		Fuse (T 1 6A / 250V) Pri	1
30	PD-35072	Power Transformer	1
31	PD-70005	System Ground	1
32	PE-95052	RCA Jack (8P)	2
33	PE-90066	Din Connector	1
34	PE-76006	Speaker Terminal (4P)	1
35	PD-71008A	AC Cord Stopper	1
36	PE-67051	AC Cord	1
37	PC-68404	Heat Sink, (Power)	1
38	K40296	Audio B'd Ass'y	1
39	K40295	Tone B'd Ass'y	1

FRONT PANEL ASS'Y PARTS LIST			
8	PC-61076	Front Panel	1
40	PE-63074	Meter Window	1
41	PE-63075	Meter Plate	1
42	PE-72172	Push SW Power Bezel	1
43	PE-72176	Double Knob Felt	1
44	PE-72175	Control Knob Felt	4

TONE PCB ASS'Y K40295

SEMICONDUCTORS

Q201L/R		T.R MPS9633C	2
Q202L/R		T.R 2SA841BL	2
Q203L/R		T.R MPS9633C	2

CAPACITORS

Ref. No.	Parts No.	Description	Q'ty
C201	50AL101-16E	Elect 100μF	16V
C202	50AL100-16E	Elect 10μF	16V
C203L/R	50AS478-16E	AI-Solid 0.47μF	16V
C204L/R	50CE101-50K	Ceramic 100PF	50V
C205L/R	50AL479-16E	Elect 4.7μF	16V
C206L/R	50MY473-50J	Mylar 0.047μF	50V
C207L/R	50MY103-50J	Mylar 0.01μF	50V
C208L/R	50MY152-50J	Mylar 0.0015μF	50V
C209L/R	50MY472-50J	Mylar 0.0047μF	50V
C210L/R	50AS109-16E	AI-Solid 1μF	16V
C212L/R	50CE680-50J	Ceramic 68PF	50V
C213L/R	50AL479 16E	Elect 4.7μF	16V

RESISTORS

R201	60F822 1/4J	Carbon 8.2K	1/4W J	1
R202	60F472 1/4J	Carbon 4.7K	1/4W J	1
R203L/R	60F102 1/4J	Carbon 1K	1/4W J	2
R204L/R	60F474 1/4J	Carbon 470K	1/4W J	2
R205L/R	60F123 1/4J	Carbon 12K	1/4W J	2
R206L/R	60F132 1/4J	Carbon 1.3K	1/4W J	2
R207L/R	60F271 1/4J	Carbon 270	1/4W J	2
R208L/R	60F103 1/4J	Carbon 10K	1/4W J	2
R209L/R	60F223 1/4J	Carbon 22K	1/4W J	2
R210L/R	60F103 1/4J	Carbon 10K	1/4W J	2
R211L/R	60F822-1/4J	Carbon 8.2K	1/4W J	2
R212L/R	60F473 1/4J	Carbon 47K	1/4W J	4
R213L/R	60F822 1/4J	Carbon 8.2K	1/4W J	2
R215L/R	60F302 1/4J	Carbon 3.9K	1/4W J	4
R216L/R	60F472 1/4J	Carbon 4.7K	1/4W J	4
R217L/R	60F472 1/4J	Carbon 120K	1/4W J	4
R218L/R	60F824 1/4J	Carbon 820K	1/4W J	2
R219L/R	60F472 1/4J	Carbon 4.7K	1/4W J	2
R220L/R	60F822 1/4J	Carbon 1K	1/4W J	2
R221L/R	60F470 1/4J	Carbon 47	1/4W J	1
R222L/R	60F472 1/4J			
R223L/R	60F102 1/4J			
R224	60F470 1/4J			

AUDIO PCB ASS'Y K40296

EQ SECTION

SEMICONDUCTORS

Q101L/R		T.R MPS9633C	2
Q102L/R		T.R 2SA841BL	2
Q103L/R		T.R MPS9633C	2
D101		Zener Diode, BZY88C20	1

CAPACITORS

C101L/R	50CE221 50J	Ceramic 220PF	50V	2
C102L/R	50AL100 50J	Elect 10μF	16V	2
C103L/R	50CE101 50K	Ceramic 100PF	50V	2
C104L/R	50AL470 16E	Elect 47μF	16V	2
C105L/R	50CE200 50J	Ceramic 20PF	50V	2
C106L/R	50MY222 50J	Mylar 0.0022μF	50V	2
C107L/R	50MY822 50J	Mylar 0.0082μF	50V	2
C108L/R	50AL79 16E	Elect 4.7μF	16V	2
C109	50AL101 16E	Elect 100μF	16V	1
C110	50AL102 25F	Elect 1000μF	25V	1

RESISTORS

R101L/R	60F154 1/4J	Carbon 150K	1/4W J	2
R102L/R	60F681 1/4J	Carbon 680	1/4W J	2
R103L/R	60F683 1/4J	Carbon 68K	1/4W J	2
R104L/R	60F153 1/4J	Carbon 15K	1/4W J	2
R105L/R	60F333 1/4J	Carbon 33K	1/4W J	2
R106L/R	60F681 1/4J	Carbon 680	1/4W J	2
R107L/R	60F124 1/4J	Carbon 120K	1/4W J	2
R108L/R	60F562 1/4J	Carbon 5.6K	1/4W J	2
R109L/R	60F394 1/4J	Carbon 390K	1/4W J	2
R110L/R	60F681 1/4J	Carbon 680	1/4W J	2

PARTS LIST

Ref. No.	Parts No.	Description	Q'ty
R111L/R	60F332-1/4J	Carbon 3.3K 1/4W J	2
R112L/R	60F473 1/4J	Carbon 47K 1/4W J	2
R113L/R	60F102-1/4J	Carbon 1K 1/4W J	2
R114	60F470-1/4J	Carbon 47 1/4W J	1
R115	60M561-1K	Oxide Metal Film 560 1W K	1

POWER SECTION

SEMICONDUCTORS			
Q301L/R		T.R. 2SA841BL	4
Q302L/R		T.R. MPS.L01	2
Q303L/R		T.R. CS9013H.G	2
Q304L/R		T.R. MPS A06	2
Q305L/R		T.R. 2SD718	2
Q306L/R		T.R. MPS A56	2
Q307L/R		T.R. 2SB688	2
Q308L/R		T.R. MPS A06	1
D301		Zener, Diode BZY88C20	1

CAPACITORS

C301L/R	50AS109-16E	Al-Solid 1μF 16V	2
C302L/R	50CE471-50J	Ceramic 470μF 50V	2
C303L/R	50CE101-50J	Ceramic 100PF 50V	4
C304L/R	50CE101-50J	Ceramic 100PF 50V	2
C305L/R	50AL220-16E	Elect 22μF 16V	2
C306L/R	50CE200-50J	Ceramic 20PF 50V	2
C307L/R	50CE473-50J	Ceramic 0.047μF 50V	2
C308L/R	50AL220-35E	Elect 22μF 35V	2
C309L/R	50CE101-50J	Ceramic 100PF 50V	2
C310L/R	50MY104-50J	Mylar 0.1μF 50V	2
C311L/R	50CE101-50J	Ceramic 100PF 50V	2
C312L/R	50AL109-50E	Elect 1μF 50V	2
C313L/R	50CE473-50J	Ceramic 0.047μF 50V	2
C314L/R	50AL109-50E	Elect 1μF 50V	2
C315	50AL470-50E	Elect 47μF 50V	1
C316	50AL101-25E	Elect 100μF 25V	1

RESISTORS

R301	60F392 1/4J	Carbon 3.9K 1/4W J	1
R302L/R	60F102-1/4J	Carbon 1K 1/4W J	2
R303L/R	60F824-1/4J	Carbon 820K 1/4W J	2
R304L/R	60F563-1/4J	Carbon 56K 1/4W J	2
R305L/R	60F182-1/4J	Carbon 1.8K 1/4W J	4
R306L/R	60F102-1/4J	Carbon 1K 1/4W J	2
R307L/R	60F103-1/4J	Carbon 10K 1/4W J	2
R308L/R	60F122-1/4J	Carbon 1.2K 1/4W J	2
R309L/R	60F272-1/4J	Carbon 2.7K 1/4W J	2
R310L/R	60F683-1/4J	Carbon 68K 1/4W J	2
R311L/R	60F152-1/4J	Carbon 1.5K 1/4W J	2
R312L/R	60F392-1/4J	Carbon 3.9K 1/4W J	2
R313L/R	60F562-1/4J	Carbon 5.6K 1/4W J	2
R316L/R	60M271-1K	Oxide Metal Film 270 1W K	2
R317L/R	60W278-3K	Cement 0.27 3W K	4
R318L/R	60F339-1/4WJ	Carbon 3.3 1/4W J	2
R319L/R	60F100-1/4WK	Oxide Metal film 10 1/2W J	2
R321	60F333-1/4J	Carbon 33K 1/4W J	2
R322L/R	60F152-1/4J	Carbon 1.5K 1/4W J	2
V.R.301L/R	PE-16004	Semifixed. 2.2K (B)	2

COILS

L301L/R	PE-30045	Coil 2.7μH	2
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METER SECTION

SEMICONDUCTORS			
O401L/R		T.R. CS9013H.G	2
D401L/R		Diode, CDG24	4
D402L/R			

Ref. No.	Parts No.	Description	Q'ty
D403L/R		Diode, 1N60	4
CAPACITORS			
C401L/R	50AI109-50E	Elect 1μF 50V	2
C402L/R	50AI100-50E	Elect 10μF 50V	2
C403L/R	50AI109-50E	Elect 1μF 50V	4

RESISTORS			
R401L/R	60F473-1/4J	Carbon 47K 1/4W J	2
R402L/R	60F123-1/4J	Carbon 12K 1/4W J	2
R403L/R	60F822-1/4J	Carbon 8.2K 1/4W J	2
R404L/R	60F154-1/4J	Carbon 150K 1/4W J	2
R405L/R	60F223-1/4J	Carbon 22K 1/4W J	2
R406L/R	60F472-1/4J	Carbon 4.7K 1/4W J	2
R407L/R	60F681-1/4J	Carbon 680 1/4W J	2
R408L/R	60F132-1/4J	Carbon 1.3K 1/4W J	2
V.R.401L/R	PE-16000	Semifixed. 4.7K(B)	2

SUPPLY SECTION			
SEMICONDUCTORS			
Q501		T.R. 2SD880	1
D501		Zener, Diode MZ-314	1
D502, 503		Diode, 3A/200V	4
D505, 505	P-300D		
CAPACITORS			
C501	50AI101-16E	Elect 100μF 16V	2
C502	50AI102-16E	Elect 1000μF 16V	2
C503	50AI471-35E	Elect 470μF 35V	1
C504	50CE103-500J	Ceramic 0.01μF 500V	4
C505, 506	50CE103-500J		
C507, 508			
C509	60A 1472-50E	Elect 4700μF 50V	2

RESISTORS			
R501	60F331-1/4J	Carbon 330ΩW 1/4W J	1
R502	60F102-1/4J	Carbon 1K 1/4W J	1
R503	60F101-1/4J	Carbon 100 1/4W J	1

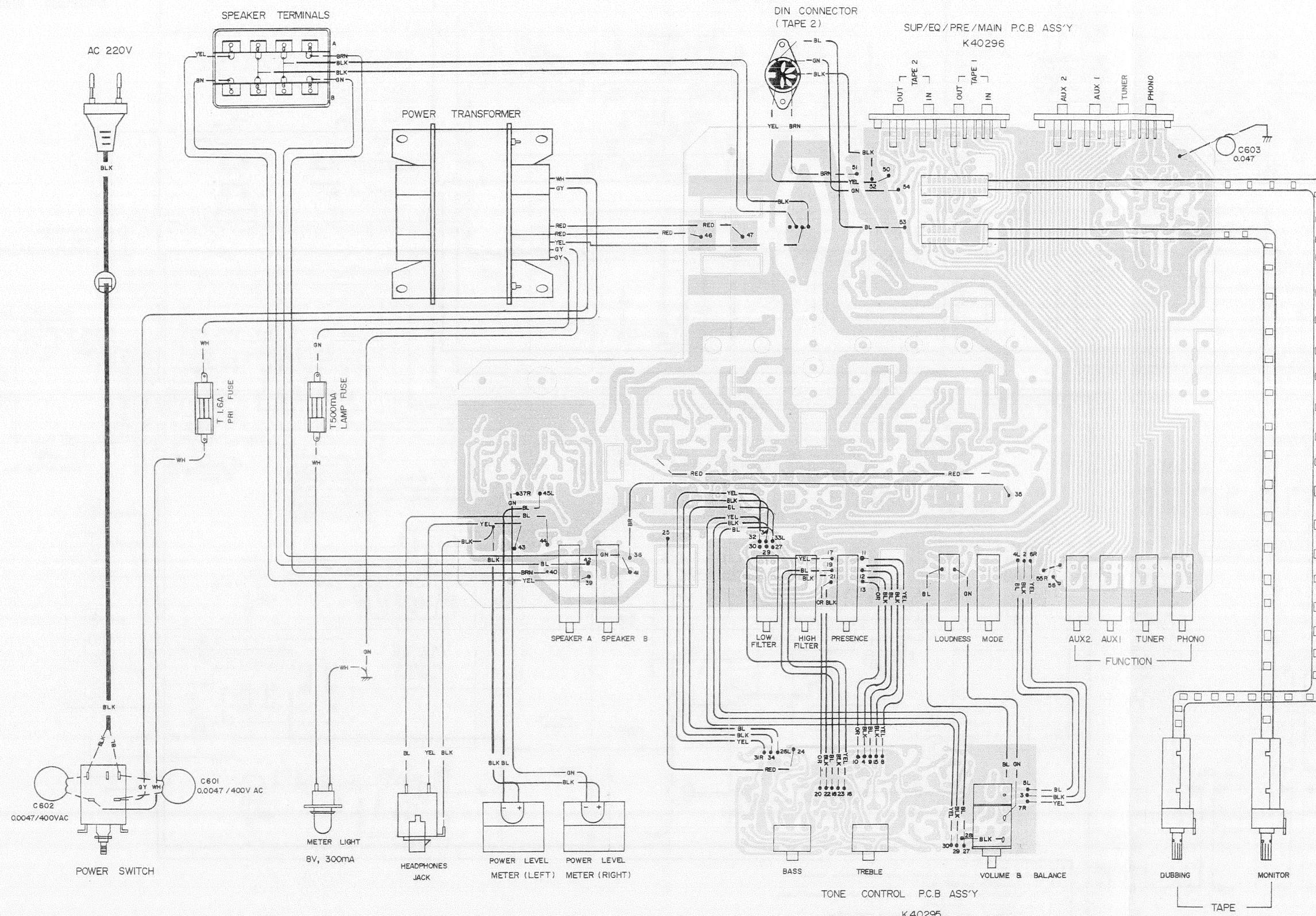
CHASSIS			
C601	ECK-DHS472MD4	Ceramic 0.0047μF 400V AC	2
C602			

PRE. DIN SECTION			
C701L/R	50MY333-50J	Mylar 0.033μF 50V	2
C702L/R	50MY153-50J	Mylar 0.015μF 50V	2
C703L/R	50CE471-50J	Ceramic 470PF 50V	2
C704L/R	50CE473-50J	Ceramic 0.047μF 50V	2

RESISTORS			
R701L/R	60F105-1/4W J	Carbon 1M 1/4W J	2
R702L/R	60F822-1/4W J	Carbon 8.2K 1/4W J	2
R703L/R	60M271-2WK	Oxide Metal Film 270 2W K	2
R705L/R	60F334-1/4W J	Carbon 330K 1/4W J	2
R709L/R	60F105-1/4W J	Carbon 1M 1/4W J	2

P.C.B			
	K40296	Audio B'd	1
	K40295	Tone B'd	1

POINT TO POINT WIRING DIAGRAM



SCHEMATIC DIAGRAM

TENSAI
MODEL TA 2160
STEREO AMPLIFIER

